Exceedance Probability Analysis for the Islip, NY Rainfall Event, 13 August 2014

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The Hydrometeorological Design Studies Center (HDSC) analyzed annual exceedance probabilities (AEPs) for the Islip, NY rainfall event that occurred on 13 August 2014. AEP is probability of exceeding a given amount of rainfall at least once in any given year at a given location. It is an indicator of the rarity of rainfall amounts and is used as the basis of hydrologic design. The Islip event delivered rainfall amounts that exceeded 11 inches in 3 hours in some locations, causing extreme flash flooding.

The rarity of this event is illustrated in two figures below. Figure 1 shows how the maximum observed rainfall amounts compared to corresponding rainfall frequency estimates for AEPs from 1/2 (50%) to 1/1000 (0.1%) for durations from 30 minutes to 72 hours for a rain gauge in the Islip area - KISP, MacArthur Airport (40.7939°N, 73.1017°W, 98 ft elevation). The KISP gauge is part of the Automated Surface Observing System (ASOS). The AEPs are preliminary estimates from unpublished NOAA Atlas 14, Volume 10, Version 1 and may differ from final estimates, which will be released in 2015. The upper bound of the 90% confidence interval for 1/1000 AEP is also shown in the figure to illustrate uncertainty associated with the calculation of AEPs, which increase as the AEP becomes smaller. As can be seen from Figure 1, probabilities are less than 1/1000 for durations between 45-min and 24-hour. Both 2-hour and 3-hour amounts exceed the upper bound of the 90% confidence interval of corresponding 1/1000 estimates.

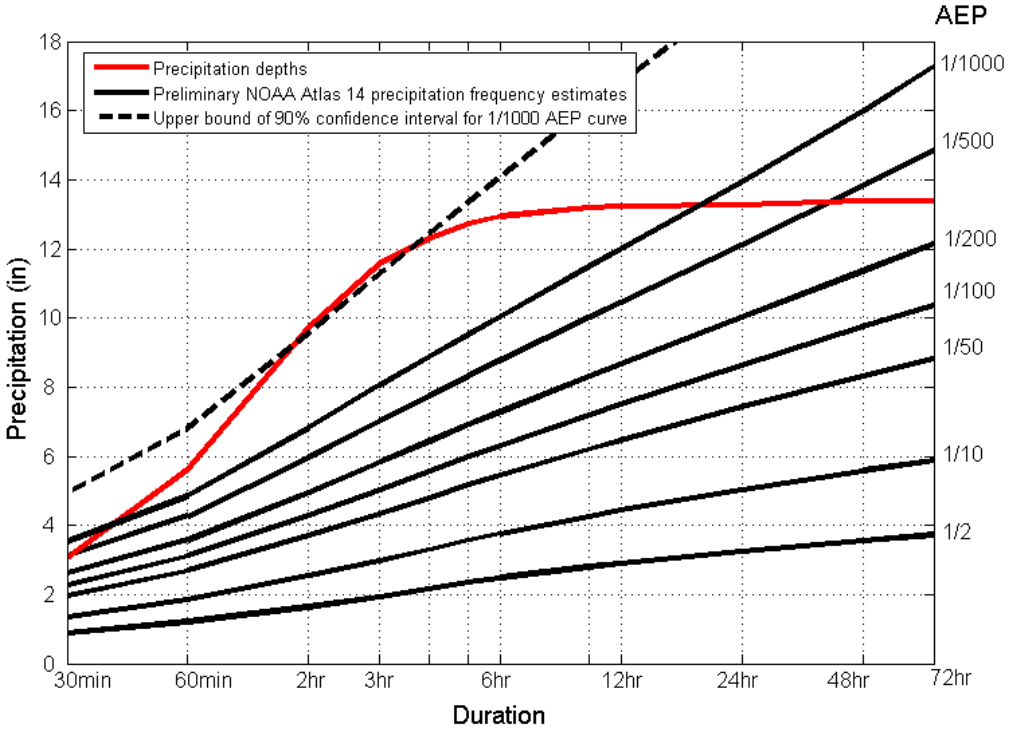

Figure 1. Maximum observed rainfall amounts in relationship to corresponding precipitation frequency estimates for the KISP ASOS gauge.

The map in Figure 2 shows the areas that experienced rainfall magnitudes with AEPs ranging from 1/10 (10%) to smaller than 1/1000 (0.1%) for the 3-hour duration. Rainfall amounts are dual-polarization quantitative precipitation estimates (QPE) from the Upton, NY (KOKX) radar. Rainfall frequency estimates are preliminary estimates from the NOAA Atlas 14, Volume 10, Version 1. The 3-hour duration was selected because it showed the smallest AEPs for the largest area. Note that the beginning and ending of the worst case observation period is not necessarily the same for each location. As a result, this map does not represent isohyets at any particular point in time, but rather the whole event.

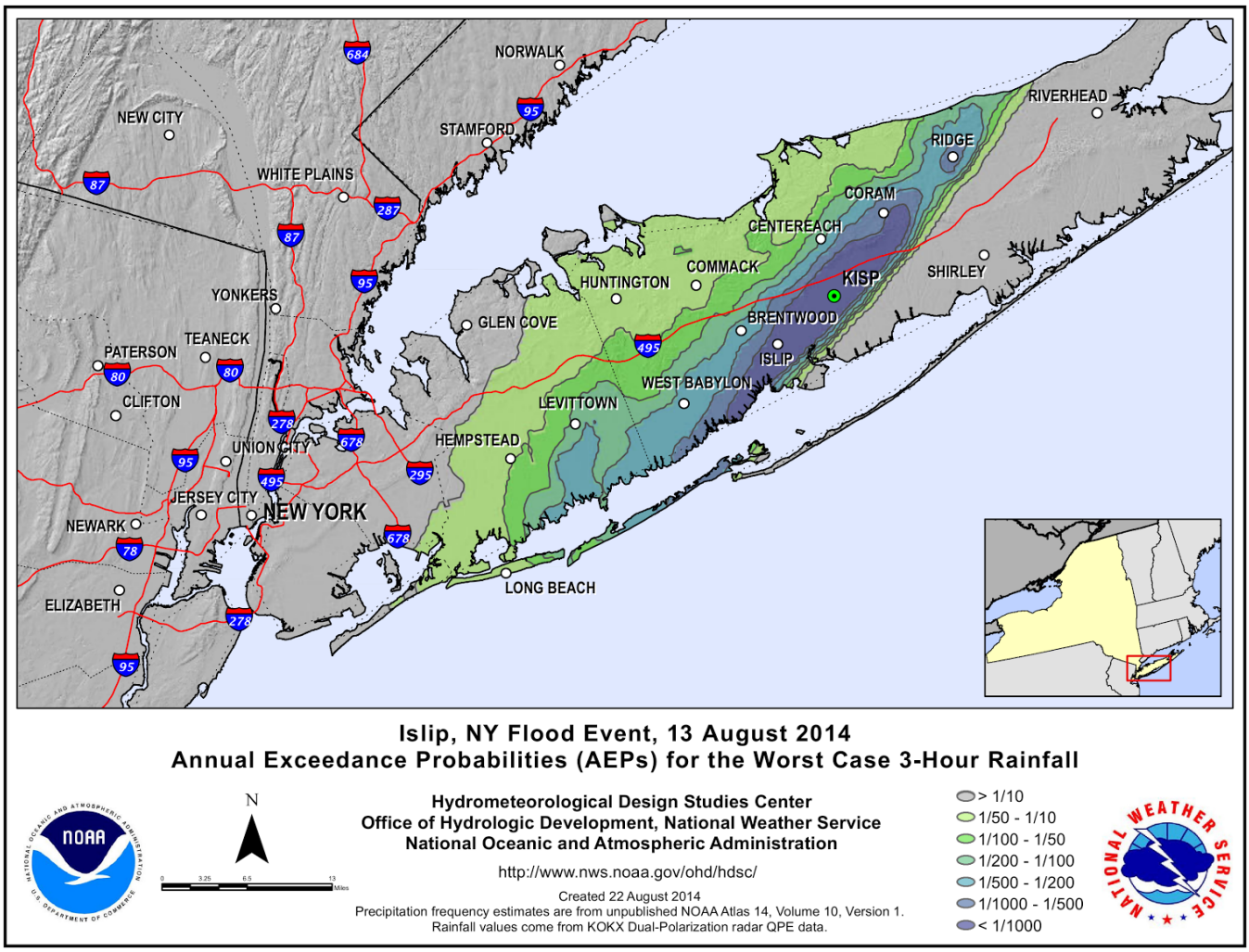

Figure 2. Annual exceedance probability for the worst case 3-hour rainfall.